



FCC 47 CFR PART 15 SUBPART C

**BLUETOOTH LOW ENERGY
CERTIFICATION TEST REPORT**

FOR

GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac & NFC

FCC ID: PY7-21831Z

REPORT NUMBER: 11589096A-E3V3

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**Prepared for
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NVLAP LAB CODE 200246-0

Revision History

| <u>Ver.</u> | <u>Issue Date</u> | <u>Revisions</u> | <u>Revised By</u> |
|-------------|-------------------|--|-------------------|
| 1 | 2017-02-20 | Initial Issue | Brian Kiewra |
| 2 | 2017-02-24 | Removed BLE reference from EUT Description and changed equipment class in Section 1.4. | Jeff Moser |
| 3 | 2017-02-24 | Deleted old PY7-29752M and added PY7-21831Z data. | Jeff Moser |

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1. REUSE OF TEST DATA

1.1. INTRODUCTION

According to manufacturer, FCC ID: PY7-29752M and FCC ID: PY7-21831Z licensed and unlicensed radios (WWAN/WLAN/BT/BLE) are electrically identical, except the NFC which has a new chipset. With the exception of the NFC, FCC ID: PY7-29752M and FCC ID: PY7-21831Z share the same chipsets, same power and same antenna performance including antenna gain. The FCC ID: PY7-29752M test data shall remain representative of FCC ID: PY7-21831Z, and therefore FCC ID: PY7-21831Z leverages test data from FCC ID: PY7-29752M.

The applicant takes full responsibility that the test data as referenced in this section represent compliance for this FCC ID.

1.2. DEVICES DIFFERENCES

Difference between PY7-29752M and PY7-21831Z:

Identical except the NFC chipset is new in PY7-21831Z. Refer to Report 11589096A-E7 for PY7-21831Z NFC data.

1.3. SPOT CHECK VERIFICATION

Spot check verification has been done on device FCC ID: PY7-21831Z for the WLAN Radiated Spurious Emissions. Note, the WLAN and BLE are part of the same chipset and 802.11b was considered worst-case for the 2.4 GHz band. Test results were consistent with FCC ID: PY7-29752M.

| Technology | Test Items | Configurations | PY7-29752M | PY7-21831Z |
|------------|-------------------|---------------------------|-------------------|-------------------|
| | | | Worst Case Result | Spot Check Result |
| WLAN | Radiated Spurious | 802.11b, 2412 MHz Chain 0 | > 10 dB Margin* | -13.71 dB Margin* |

*This frequency was considered Noise Floor.

1.4. REFERENCE DETAIL

| Equipment Class | Reference FCC ID | Report Title/Section |
|-----------------|------------------|-------------------------------|
| DTS | PY7-29752M | 16J23633A-E3V2 FCC Report BLE |

2. ATTESTATION OF TEST RESULTS

COMPANY NAME: SONY MOBILE COMMUNICATIONS, INC.
4-12-3 HIGASHI-SHINAGAWA,
SHINAGAWA -KU,TOKYO, 140-0002, JAPAN

EUT DESCRIPTION: GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac & NFC

SERIAL NUMBER: Radiated: QV7000ZG0E

DATE TESTED: 2017-02-20

| APPLICABLE STANDARDS | |
|--------------------------|--------------|
| STANDARD | TEST RESULTS |
| CFR 47 Part 15 Subpart C | Pass |

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL LLC based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

Approved & Released
For UL LLC By:



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Prepared By:



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3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2013.

4. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 12 Laboratory Dr., Research Triangle Park, NC 27709, USA and 2800 Suite B, Perimeter Park Drive, Morrisville, NC 27560.

| |
|------------------------------------|
| 12 Laboratory Dr., RTP, NC 27709 |
| <input type="checkbox"/> Chamber A |
| <input type="checkbox"/> Chamber C |

| |
|---|
| 2800 Suite B Perimeter Park Dr., Morrisville, NC 27560 |
| <input checked="" type="checkbox"/> Chamber NORTH |
| <input type="checkbox"/> Chamber SOUTH |

UL LLC (RTP) is accredited by NVLAP, Laboratory Code 200246-0. The full scope of accreditation can be viewed at <http://www.nist.gov/nvlap/>

5. CALIBRATION AND UNCERTAINTY

5.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

5.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

5.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

| PARAMETER | UNCERTAINTY |
|--|-------------|
| Conducted Disturbance, 0.15 to 30 MHz | 3.52 dB |
| Radiated Disturbance, 9KHz to 30 MHz | 3.15 dB |
| Radiated Disturbance, 30 to 1000 MHz | 5.36 dB |
| Radiated Disturbance, 1000 to 18000 MHz | 4.32 dB |
| Radiated Disturbance, 18000 to 26000 MHz | 4.45 dB |
| Radiated Disturbance, 26000 to 40000 MHz | 5.24 dB |

Uncertainty figures are valid to a confidence level of 95%.

6. EQUIPMENT UNDER TEST

6.1. DESCRIPTION OF EUT

The EUT is a GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac & NFC

6.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

| Frequency Range (MHz) | Mode | Output Power (dBm) | Output Power (mW) |
|-----------------------|------|--------------------|-------------------|
| 2402 - 2480 | BLE | 6.40 | 3.94 |

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes two integrated antennas, with the following maximum gains:

| Frequency Range (MHz) | Antenna Gain (dBi) |
|-----------------------|--------------------|
| | Ant 0 (Main) |
| 2402 – 2480 | -6.2 |

6.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was SONY, s_atp_1_600_7_9.

The test utility software used during testing was Tera Term ver 4.89 (SVN# 6182).

6.5. WORST-CASE CONFIGURATION AND MODE

Radiated emission and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

The fundamental of the EUT was investigated in three orthogonal orientations X,Y,Z, it was determined that X-Axis orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X-Axis orientation. Note – This was the case for BLE and 2.4 GHz 802.11.

6.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

| Support Equipment List | | | | |
|------------------------|--------------|--------------|-----------------|--------|
| Description | Manufacturer | Model | Serial Number | FCC ID |
| Desktop | Lenovo | ThinkCentre | MG00ADEN | NA |
| Laptop | Lenovo | T450 | RTP0116PC0A2UQT | NA |
| Headphones | Sony | MH410x | 12271A100010396 | NA |
| PowerSupply | Sony | 1300-7146.1B | 5816W02400051 | NA |

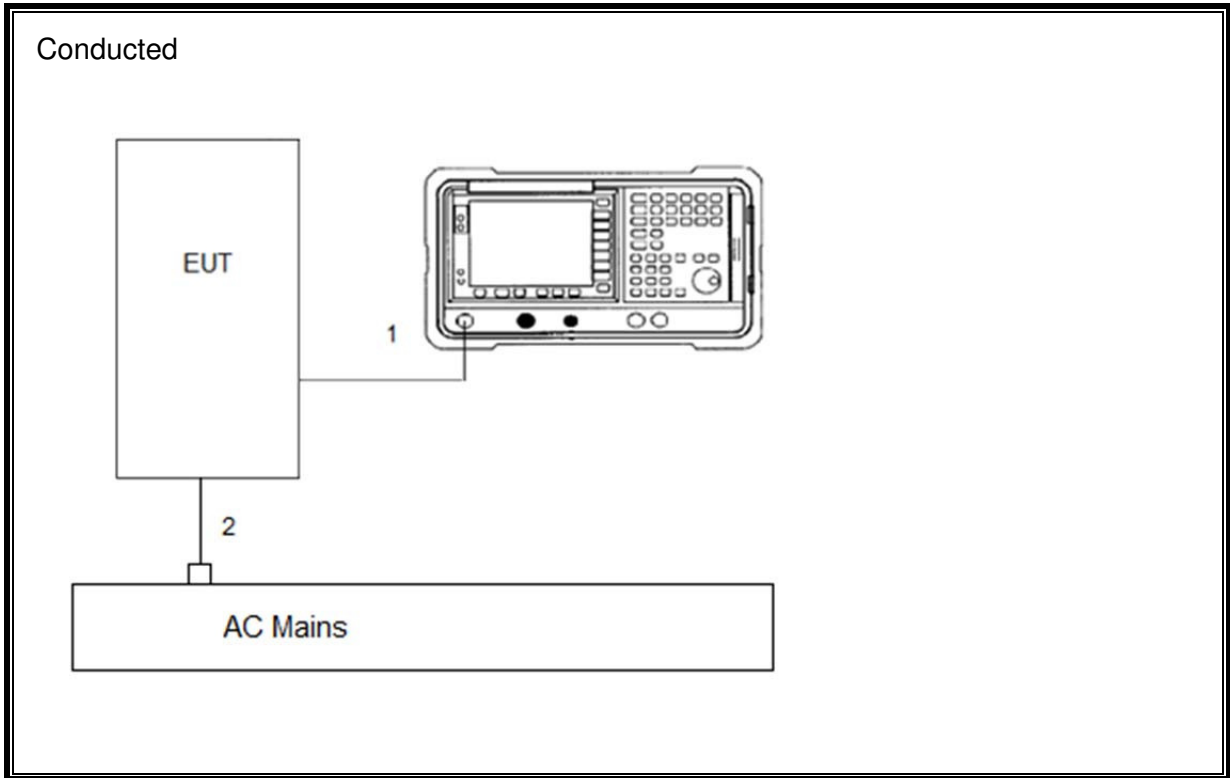
I/O CABLES

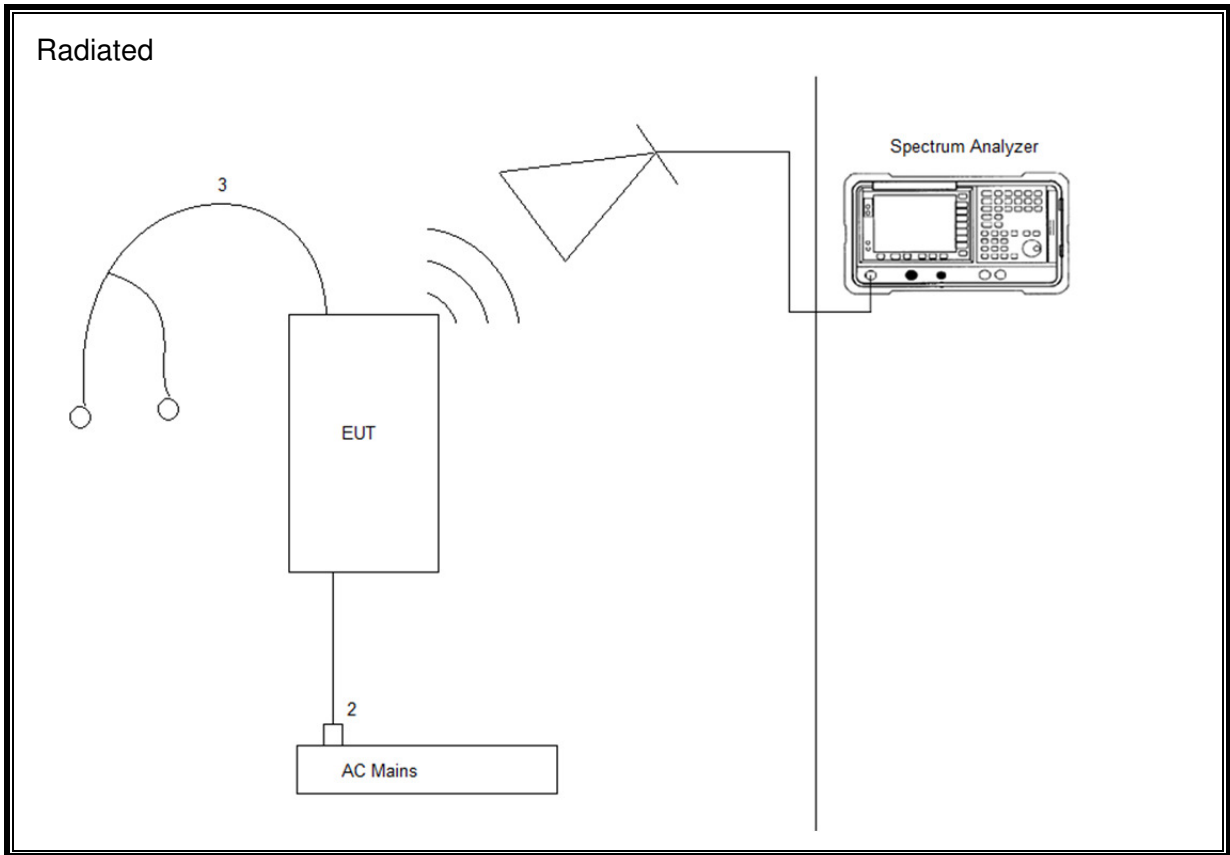
| I/O Cable List | | | | | |
|----------------|--------------|----------------------|----------------|------------------|-----------|
| Cable No | Port | # of Identical ports | Connector Type | Cable Length (m) | Remarks |
| 1 | Antenna Port | 1 | RF | <1m | NA |
| 2 | DC Mains | 1 | Mini-USB | >1m | NA |
| 3 | Audio | 1 | 3.5mm | >1m | Headphone |

TEST SETUP

The EUT is setup as a standalone device. Test software exercised the radio card.

SETUP DIAGRAM FOR TESTS





7. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville - North Chamber)

| Equip. ID | Description | Manufacturer | Model Number | Last Cal. | Next Cal. |
|------------------|---|---------------------|---------------------|------------------|------------------|
| | 1-18 GHz | | | | |
| AT0072 | Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz | ETS Lindgren | 3117 | 2016-03-07 | 2017-03-31 |
| | Gain-Loss Chains | | | | |
| N-SAC03 | Gain-loss string: 1-18GHz | Various | Various | 2016-08-28 | 2017-08-28 |
| | Receiver & Software | | | | |
| SA0026 | Spectrum Analyzer | Agilent | N9030A | 2017-02-17 | 2018-02-17 |
| SOFTEMI | EMI Software | UL | Version 9.5 | NA | NA |

8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

| Frequency Range (MHz) | Field Strength Limit (uV/m) at 3 m | Field Strength Limit (dBuV/m) at 3 m |
|-----------------------|------------------------------------|--------------------------------------|
| 0.009-0.490 | 2400/F(kHz) @ 300 m | - |
| 0.490-1.705 | 24000/F(kHz) @ 30 m | - |
| 1.705 - 30 | 30 @ 30m | - |
| 30 - 88 | 100 | 40 |
| 88 - 216 | 150 | 43.5 |
| 216 - 960 | 200 | 46 |
| Above 960 | 500 | 54 |

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for below 1GHz measurements and 1.5 m above the ground plane for above 1GHz measurements. The antenna to EUT distance is 3 meters.

For measurements below 1 GHz the resolution bandwidth is set to 120 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements for the 30-1000 MHz range, 9 kHz for peak detection measurements or 9 kHz for quasi-peak detection measurements for the 0.15-30 MHz range and 200 Hz for peak detection measurements or 200 Hz for quasi-peak detection measurements for the 9 to 150 kHz range. Peak detection is used unless otherwise noted as quasi-peak.

For peak measurements above 1 GHz, the resolution bandwidth is set to 1 MHz and the video bandwidth is set to 3 MHz. For average measurements above 1GHz, the resolution bandwidth and video bandwidth are set as described in ANSI C63.10:2013 for the applicable measurement. For this evaluation, RMS Power Averaging was used and the resolution/video bandwidth settings were 1MHz/3MHz.

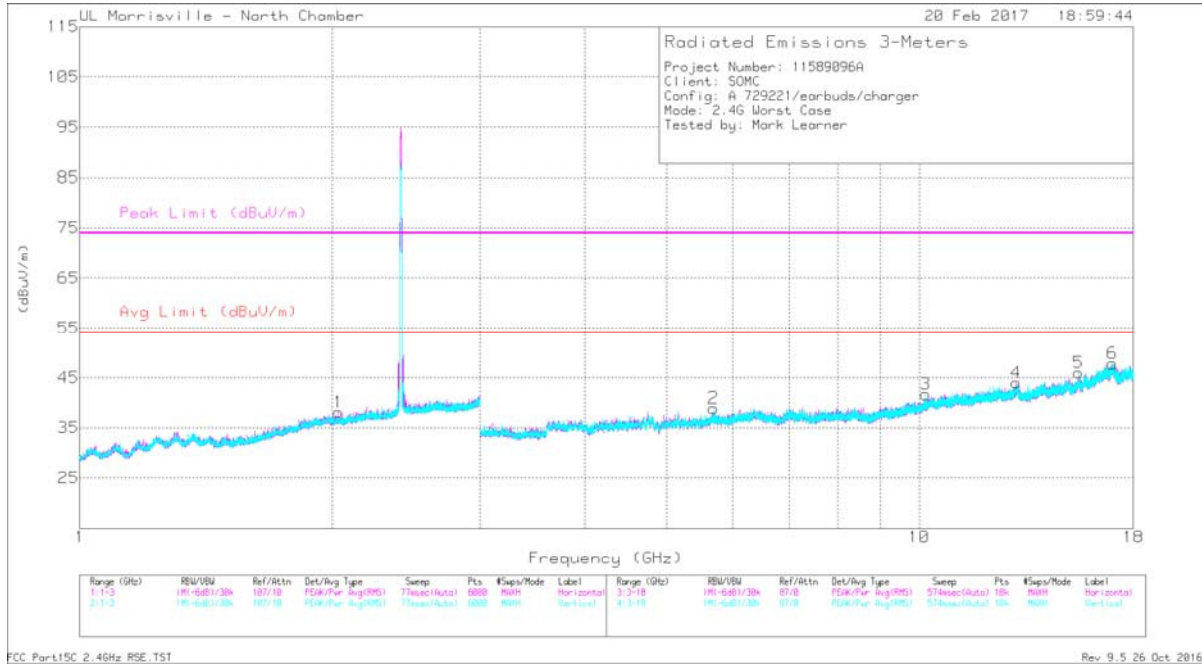
The spectrum from 9 kHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

8.2. TX ABOVE 1 GHz FOR BLE MODE IN THE 2.4 GHz BAND

HARMONICS AND SPURIOUS EMISSIONS

2.4 GHz 802.11b



Trace Markers

| Marker | Freq. (GHz) | Meter Reading (dBuV) | Det | AF AT0072 (dB/m) | Amp/Cbl/Fit r/Pad (dB) | Corrected Reading (dBuV/m) | Avg Limit (dBuV/m) | Margin (dB) | Peak Limit (dBuV/m) | PK Margin (dB) | Azimuth (Degs) | Height (cm) | Polarity |
|--------|-------------|----------------------|------|------------------|------------------------|----------------------------|--------------------|-------------|---------------------|----------------|----------------|-------------|----------|
| 5 | * 15.48 | 35.89 | PK2 | 40.1 | -24.4 | 51.59 | - | - | 74 | -22.41 | 332 | 116 | V |
| | * 15.48 | 24.59 | MAv1 | 40.1 | -24.4 | 40.29 | 54 | -13.71 | - | - | 332 | 116 | V |
| 1 | 2.033 | 31.26 | Pk | 31.3 | -24.5 | 38.06 | - | - | - | - | 0-360 | 199 | H |
| 2 | 5.689 | 35.68 | Pk | 34.7 | -31.5 | 38.88 | - | - | - | - | 0-360 | 102 | V |
| 3 | 10.18 | 31.77 | Pk | 37.2 | -27.3 | 41.67 | - | - | - | - | 0-360 | 102 | V |
| 4 | 13.054 | 30.37 | Pk | 39.2 | -25.6 | 43.97 | - | - | - | - | 0-360 | 101 | H |
| 6 | 16.982 | 31.02 | Pk | 41.9 | -25.1 | 47.82 | - | - | - | - | 0-360 | 102 | V |

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

PK2 - Maximum Peak

MAv1 -Maximum RMS Average

FCC Part15C 2.4GHz RSE.TST

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